What is claimed is:

1. A circuit to control the capacitance of a variable capacitor in a strictly linear mode through a steady tuning voltage and to achieve a high Q-factor at the same time; comprising:

a set of individual small capacitors;

a set of capacitor switching stages, each stage comprising;

a switching device, allowing a steady ramp-up/ramp-down phase between the points of being fully switched on and fully switched off, and where said switching device is connected in series with one of said capacitors, to connect a multiple of said capacitors in parallel;

a circuit to control the switching operation of said switching device in a steady ramp-up/ramp-down manner between the points of being fully switched on and fully switched off, comprising:

a translinear amplifier to produce a ramp-up/ramp-down signal for said switching device, where said translinear amplifier is implemented within said circuit to control the switching operation;

a common circuit to provide a set of input and output reference levels for each of said capacitor switching stages, used as input reference levels and output reference levels for each of said translinear amplifiers, comprised within said circuits to control the switching operation; and

input signals, each dependent on the tuning voltage, dedicated for the voltage controlled capacitance change, provided to an input of all of said capacitor switching stages.

2. The circuit of claim **1** wherein said switching device with steady ramp-up/ramp-down phase is a FET transistor.

3. The circuit of claim **2** wherein said switching device with steady ramp-up/ramp-down phase is a P-channel or N-channel junction FET.

4. The circuit of claim **2** wherein said switching device with steady ramp-up/ramp-down phase is a PMOS or NMOS FET.

5. (Previously Canceled)

6. The circuit of claim **1** wherein said circuit to generate a set of input reference levels, one for each of said capacitor switching stages, is implemented as a chain of resistors.

7. The circuit of claim **1** wherein said translinear amplifier has a gain of 1, the typical gain of translinear amplifiers.

8. The circuit of claim **1** wherein said translinear amplifier has a gain differing from 1, which gives one more degree of freedom to optimize the operating parameters by making the steepness of the switching device's gate control voltage versus tuning voltage adjustable through proper gain selection, thus making the

overlapping of capacitor switching operation independent of the selected distance of the switching points of adjacent capacitor stages.

9. The circuit of claim **1** wherein said circuit to provide a signal, dependent on the tuning voltage, dedicated for the voltage controlled capacitance change, is a single signal connected to all of said capacitor switching stages.

10. The common circuit of claim **1** to provide said set of input and output reference levels for each of said capacitor switching stages, implements said output reference levels for said translinear amplifiers, by a single signal, connected to all translinear amplifier's output reference points in common.

11. The circuit of claim **1** wherein said capacitors are discrete capacitor components.

12. The circuit of claim **1** wherein said capacitors are manufactured on a planar carrier, separate from the circuit carrier.

13. The circuit of claim **1** wherein said capacitors are integrated on a semiconductor substrate, but on a separate substrate than said switching devices and amplifiers.

14. The circuit of claim 1 wherein said capacitors are integrated on a semiconductor substrate and on the same substrate as said switching devices and amplifiers.

15. The circuit of claim 1 wherein said capacitors are manufactured as a Metal-Oxide structure.

16. The circuit of claim 1 wherein said capacitors are manufactured as a junction capacitor.

17. A circuit to control the capacitance of a variable capacitor in a strictly linear mode through a steady tuning voltage and to achieve a high Q-factor at the same time, by controlling a multiple of switching devices through steady control signals when said switching devices operate within their steady ramp-up/ramp-down area and by sharply cutting off the control signals, when said switching devices operate outside their steady ramp-up/ramp-down area; comprising:

a set of individual small capacitors;

a set of capacitor switching stages, each stage comprising:

a switching device allowing said steady ramp-up/ramp-down phase between the points of being fully switched on and fully switched off, and where said switching device is connected in series with one of said capacitors, to connect a multiple of said capacitors in parallel;

a circuit to control the switching operation of said switching device in a steady ramp-up/ramp-down manner, comprising:

a translinear amplifier to produce a steady ramp-up/ramp-down signal for said switching device, where said translinear amplifier is implemented within said circuit to control the switching operation;

a first cut-off circuit to drive said switching device to a fully on status, when said switching device operates outside said steady ramp-up/ramp-down area on said switching device's low resistance side, and implemented in combination with said translinear amplifier;

a second cut-off circuit to drive said switching device to a fully off status, when said switching device is beyond said steady ramp-up/ramp-down area on said switching device's high resistance side, and implemented in combination with said translinear amplifier;

a common circuit to provide a set of input and output reference levels for each of said capacitor switching stages, used as input reference levels and output reference levels for each of said translinear amplifiers, comprised within said circuits to control the switching operation; and

input signals, each dependent on the tuning voltage, dedicated for the voltage controlled capacitance change, provided to an input of all of said capacitor switching stages.

18. The circuit of claim **17** wherein said first cut-off circuit to drive said switching device to a fully-on status, when said switching device operates outside its desired steady transition area on the lower resistance side is provided by additional circuit elements, working as a signal cutoff function.

19. The circuit of claim **17** wherein said a second cut-off circuit to drive said switching device to a fully-off status, when said switching device operates outside its desired steady transition area on the higher resistance side is provided by additional circuit elements, working as a signal cutoff function.

20. The first cut-off circuit of claim **18** to drive said switching device to a fully-on status, when said switching device operates outside its desired steady ramp-up/ramp-down area on said switching device's low resistance side, is implemented as a signal cutoff function within said translinear amplifier circuit.

21. The second cut-off circuit of claim **19** to drive said switching device to a fully-off status, when said switching device operates outside its desired steady ramp-up/ramp-down area on said switching device's high resistance side, is implemented as a signal cutoff function within said translinear amplifier circuit.

22. The circuit of claim **17** wherein said translinear amplifier has a gain of 1, the typical gain of translinear amplifiers.

23. The circuit of claim **17** wherein said translinear amplifier has a gain differing from 1, which gives one more degree of freedom to optimize operating parameters, like overlapping of capacitor switching operation and signal cutoff at the edges of said steady ramp-up/ramp-down area.

24. (Previously Canceled)

25. (Previously Canceled)

26. A circuit to control the capacitance of a variable capacitor in a strictly linear mode through a steady tuning voltage and to achieve a high Q-factor at the same time, by controlling a multiple of capacitor switching devices through steady control signals and by compensating the temperature deviation of said capacitor switching devices; comprising:

a set of individual small capacitors;

a set of capacitor switching stages, each stage comprising:

a switching device allowing a steady ramp-up/ramp-down phase between the points of being fully switched on and fully switched off, and where said switching device is connected in series with one of said capacitors to connect a multiple of said capacitors in parallel;

a circuit to control the switching operation of said switching device, in a steady ramp-up/ramp-down manner, comprising:

a translinear amplifier to produce a control signal for said switching device, and implemented within said circuit to control the switching operation;

a temperature compensating circuit to compensate the temperature deviation of said switching device, and connected to an output reference point of said circuit to control the switching operation;

a common circuit to provide a set of input and output reference levels for each of said capacitor switching stages, used as input reference levels and output reference levels for each of said translinear amplifiers, comprised within said circuit to control the switching operation; and

input signals, each dependent on the tuning voltage, dedicated for the voltage controlled capacitance change, provided to an input of all of said capacitor switching stages.

27. The circuit of claim **26** wherein said temperature compensating circuit to compensate the temperature deviation of said switching device is provided by feeding a modified reference voltage to said translinear amplifier's output reference point, to mirror a temperature correcting signal into the control signal of said switching device.

28. The circuit of claim **27** wherein said temperature compensating circuit to compensate the temperature deviation of said switching device, uses a device of

the same type as said switching device itself, to produce an exact equivalent of said temperature deviation.

29. (Previously Canceled)

30. The circuit of claim **1** wherein said common circuit to individually provide said input reference levels for each of said capacitor switching stages, generates a set of reference values, one value for each capacitor switching stage, in a non-linear relation between said tuning voltage and said input reference levels.

31. The circuit of claim **30** wherein said common circuit to individually provide said input reference levels, for each circuit to control the switching operation in a non-linear relation between said tuning voltage and said input reference levels, is provided by specifically selecting the steps of a set of reference values in a way, to achieve said desired non-linear relation.

32. The circuit of claim **31** wherein said common circuit to generate said set of input reference levels, one for each of said circuit to control the switching operation in a non-linear relation, is implemented as a chain of resistors.

33. A method to control the capacitance of a variable capacitor in a strictly linear mode through a tuning voltage and to achieve a high Q-factor at the same time; comprising:

providing a set of individual small capacitors, a set of capacitor switching stages, each comprising: a switching device allowing a steady ramp-up/ramp-down phase between the points of being fully switched on and fully switched off, and where said switching device is connected in series with one of said capacitors, to connect a multiple of said capacitors in parallel, a circuit to control the switching operation of said switching device in a ramp-up/ramp-down manner between the points of being fully switched on and fully switched off and comprising a translinear amplifier, a common circuit to provide a set of input reference levels and output reference levels for said capacitor switching stages, and input signals, dependent on the tuning voltage and dedicated for the voltage controlled capacitance change;

providing an individual input reference level and an output reference level for each capacitor switching stage;

supplying one of said input signals, dependent on the tuning voltage, dedicated for a voltage controlled capacitance change, to all of said capacitor switching stages;

amplifying, by means of said translinear amplifier, a difference of said tuning voltage and said input reference level within each capacitor switching stage, to produce a linear control signal for a ramp-up/ramp-down switching operation;

fully switching on one of said switching devices in order to completely switch one of said small capacitors in parallel to the already switched on capacitors, one after the other to linearly increase the total capacitance;

fully switching off one of said switching devices in order to completely disconnect one of said small capacitors from the other switched on capacitors, one after the other, to linearly decrease the total capacitance; and

ramping up or ramping down the switching operation of one of said switching devices to partially switch, with increasing or decreasing share, one of said small capacitors in parallel to the already switched on capacitors, one after the other.

34. The method of claim **33** wherein linearly controlling the switching operation applies to a FET transistor as the switching device with steady ramp-up/ramp-down phase..

35. The method of claim **34** wherein linearly controlling the switching operation applies to a P-channel or N-channel junction FET as said switching device with steady ramp-up/ramp-down phase.

36. The method of claim **34** wherein linearly controlling the switching operation applies to a P-channel or N-channel MOS FET as said switching device with steady ramp-up/ramp-down phase.

37. The method of claim **33** wherein individually providing said input and output reference levels for each individual capacitor switching stage, generates two sets

of reference values, one set of input reference levels and one set of output reference levels.

38. The method of claim **37** wherein generating a set of reference values, one for each of said capacitor switching stages, is performed by a chain of resistors.

39. The method of claim **33** wherein continually switching on one of said small capacitors in parallel to the already switched on capacitors applies to discrete capacitor components.

40. The method of claim **33** wherein continually switching on one of said small capacitors in parallel to the already switched on capacitors applies to capacitors manufactured on a planar carrier, separate from the circuit carrier.

41. The method of claim **33** wherein continually switching on one of said small capacitors in parallel to the already switched on capacitors applies to capacitors integrated on a semiconductor substrate.

42. The method of claim **33** wherein supplying a tuning voltage, dedicated for the voltage controlled capacitance change, to all of said capacitor switching stages uses a single signal connected to all amplifier inputs.

43. A method to control the capacitance of a variable capacitor in a strictly linear mode through a tuning voltage and to achieve a high Q-factor at the same time by sharply cutting off the control signal, when a switching device operates outside its steady ramp-up/ramp-down area; comprising:

providing a set of individual small capacitors, a set of capacitor switching stages, each comprising: a switching device allowing a steady ramp-up/ramp-down phase between the points of being fully switched on and fully switched off, and where said switching device is connected in series with one of said capacitors, to connect a multiple of said capacitors in parallel, a circuit to control the switching operation of said switching device in a ramp-up/ramp-down manner between the points of being fully switched on and fully switched off and comprising, in addition to a translinear amplifier, a first cut-off circuit to drive it to a fully-on status, as well as a second cut-off circuit to drive it to a fully-off status, , a common circuit to provide a set of input reference levels and output reference levels for said capacitor switching stages, and input signals, dependent on the tuning voltage and dedicated for the voltage controlled capacitance change;

providing an individual input reference level for each capacitor switching stage;

supplying one of said input signals, dependent on the tuning voltage, dedicated for a voltage controlled capacitance change, to all of said capacitor switching stages;

amplifying, with said translinear amplifier, the difference of said tuning voltage and said individual input reference level within each capacitor switching

stage, to produce a linear control signal for a ramp-up/ramp-down switching operation;

steadily ramp-up/ramp-down switching on or off said switching device in order to partially switch, with increasing or decreasing share, said small capacitor in parallel to the already switched on capacitors, one after the other, to linearly increase or decrease the total capacitance;

linearly controlling the switching function for each of said switching device with steady ramp-up/ramp-down phase, when said switching device is in its steady ramp-up/ramp-down area;

activating said first cut-off circuit, when said switching device operates outside its steady ramp-up/ramp-down area on said switching device's low resistance side and thus taking over full control of said switching device by driving it to a fully-on state; and

activating said second cut-off circuit, when said switching device is beyond its steady ramp-up/ramp-down area on said switching device's high resistance side, and thus taking over full control of said switching device by driving it to a fully-off state.

44. The method of claim **43** wherein driving said switching device to a fully-on status, when said switching device operates outside its desired steady ramp-up/ramp-down area on said switching device's low resistance side uses additional circuit elements, working as a signal cutoff function.

45. The method of claim **43** wherein driving said switching device to a fully-off status, when said switching device operates outside its steady ramp-up/ramp-down area on said switching device's high resistance side uses additional circuit elements, working as a signal cutoff function.

46. The method of claim **44** wherein said signal first and/or second cutoff function to drive said switching device to a fully-on status, when said switching device operates outside its steady ramp-up/ramp-down area on the low resistance is implemented within said translinear amplifier.

47. A method to control the capacitance of a variable capacitor in a strictly linear mode through a tuning voltage and to achieve a high Q-factor at the same time and to compensate the temperature deviation of the capacitor switching device; comprising:

providing a set of individual small capacitors, a set of capacitor switching stages, each comprising: a switching device with steady ramp-up/ramp-down phase to continually switch on said capacitors in parallel, a circuit to control the switching operation of said switching device and comprising a translinear amplifier, a temperature compensating circuit to compensate the temperature deviation of said switching device, a common circuit to provide set of input reference levels and output reference levels for each individual capacitor switching stage, and input signals, dependent on the tuning voltage and dedicated for the voltage controlled capacitance change;

providing an individual input reference level and an output reference level for each capacitor switching stage;

supplying one of said input signals, dependent on the tuning voltage, dedicated for the voltage controlled capacitance change, to all of said capacitor switching stages;

amplifying, with said translinear amplifier, the difference of said tuning voltage and said individual input reference level within each capacitor switching stage, to produce a linear control signal for a ramp-up/ramp-down switching operation;

continually switching on one of said switching devices with steady ramp-up/ramp-down phase in order to switch one of said small capacitors in parallel to the already switched on capacitors, one after the other;

linearly controlling the switching function for each of said switching devices with steady ramp-up/ramp-down phase; and

compensating the temperature deviation of said switching device, using said temperature compensating circuit to compensate the temperature deviation of said switching device and providing a compensated output reference level to said circuit to control the switching operation.

48. The method of claim **47** wherein compensating the temperature deviation of said switching device is provided by feeding a modified reference voltage to said translinear amplifier's output reference point, to mirror a temperature correcting signal into the control signal of said switching device.

49. The method of claim **48** compensating the temperature deviation of said switching device, uses a device of the same type as said switching device itself, to produce an exact equivalent of said temperature deviation.

50. (Previously Canceled)

51. The method of claim **33** wherein individually providing said input reference levels for each individual capacitor switching stage generates a set of reference values, one value for each capacitor switching stage in a non-linear relation between said tuning voltage and said input reference levels.

52. The method of claim **51** wherein providing a non-linear relation between said tuning voltage and said input reference levels is provided by specifically selecting the steps of said set of reference values in a way, to achieve said desired non-linear relation.